ACT/047/002
FILE

Situation Report

Shale Runs in the Family at Geokinetics

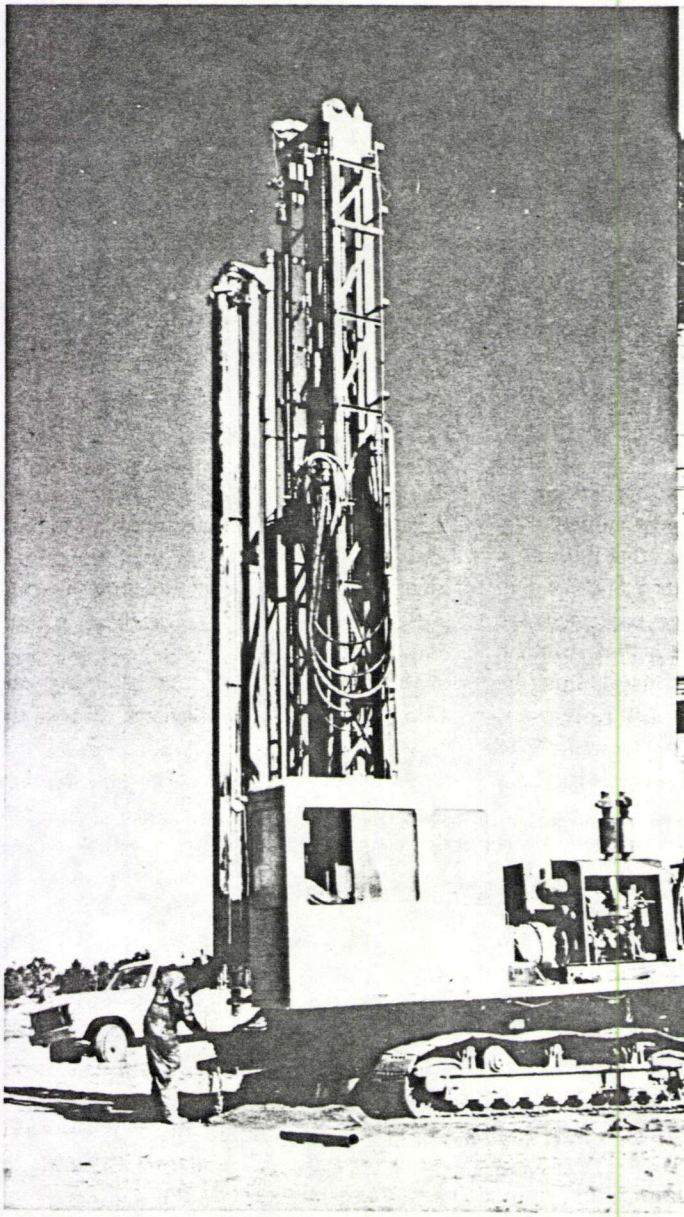
By Anne Wasko

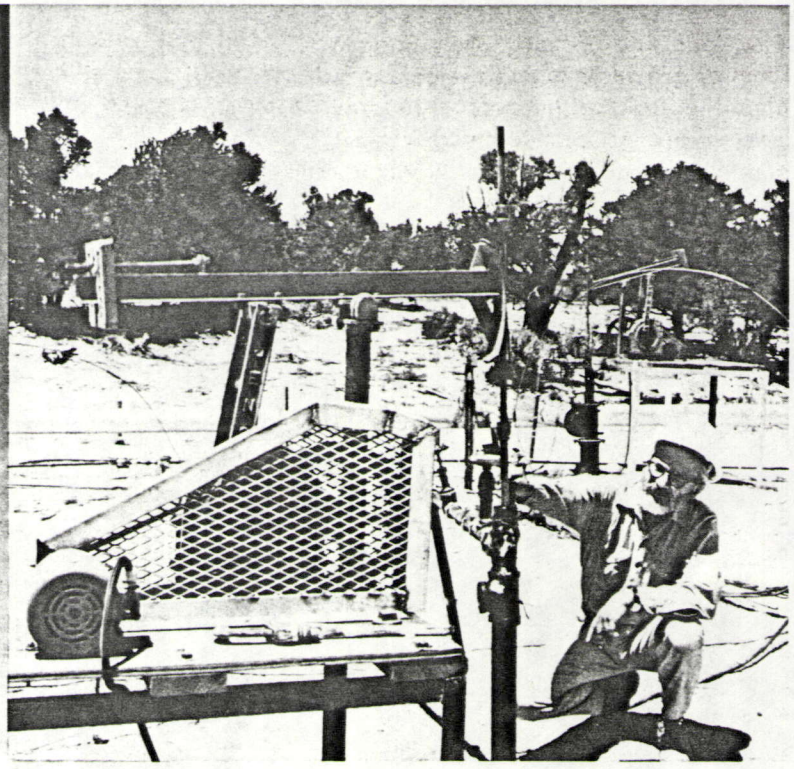
To most people the energy industry means big companies operating on a large scale. There are, of course, quite a few exceptions to that rule, one of them being Geokinetics, Inc., in Utah.

Geokinetics, which is headed by company president Mike Lekas, started as a family operation and continues to believe that small is beautiful. By developing a method of shale oil recovery that operates on a modular principal, Geokinetics is making step-by-step progress toward commercial production.

Pitching the tents

The firm was founded in 1969 to conduct





Large rigs (left) are used to drill blast holes for Geokinetics' in-situ retorts. Mike Lekas (above), president of Geokinetics, points out features of an oil production well.

mineral exploration and development, but by 1973, the company was lab testing ways of extracting oil from shale, as well as trying to acquire land on which to conduct field experiments. In 1975 both these elements combined, so Lekas, his family and several employees pitched a few tents on state-leased land in Uintah County, UT, christened the site Kamp Kerogen, and began oil shale development work in earnest. For the first year, everyone lived, ate and slept at the site, which is 70 miles from Vernal, UT, while testing various segments of Geokinetics' technology.

"It was like a family camping trip," says Jim Lekas, project manager and Mike's son, "except most people think of camping as a vacation. As the project started to meet expectations, both the camp and the scope of our work began to grow."

The process being tested at the site was developed by Geokinetics and is called LOFRECO (Low Front End Cost). LOFRECO is a true in-situ (in-place) method of extracting oil from shale, which means no mining is required and retorting—heating the shale to 900° Fahrenheit to release the oil—is done underground. This is accomplished by drilling a series of blast holes and setting off precisely timed explosions to fracture the rock in a predetermined way. Then, the retort area is ignited underground to heat the crushed rock. As the burn front moves along, the oil shale is heated ahead of it; the oil is "baked out" and pumped to the surface. Because the process takes place underground, the spent shale (rock that remains after the oil is removed) can be left behind, rather than being disposed of on the surface.

In search of land

But it took some doing for the firm to acquire lands on which to field test this process. In the early 1970s, when the federal government announced it would lease six tracts of land (two each in Colorado, Utah and Wyoming) for a prototype oil shale program, Geokinetics was interested in three of the tracts. However, it was an unsuccessful bidder, so the lab tests continued while the search for land went on. Finally, in March of 1975, Geokinetics acquired a lease on state-owned land in Utah—nonadjacent leases totaling 30,000 acres have now been obtained—and immediate on-site testing began.

"When we lit our first retort in 1976, we were still living in tents," says Lekas. "And although we had lab tested the process, we weren't prepared to produce oil that first time.

"When we ignited Retort 1, we had a 5-gallon can ready, just in case we did get some oil. Well, we did produce oil, and it wasn't long before we had to run around and find any coffee can in camp to hold it. Finally we went to town to buy a barrel, and before the test was over, we had produced 18 barrels of oil from our first retort."

About the time the people at Kamp Kerogen were collecting shale oil in coffee cans, the Dept. of Energy (DOE) was negotiating several cooperative financing agreements with companies working on shale development. Lekas says, "DOE looked around and saw a bunch of wild people living in the wilderness, but we were producing oil from shale, and using an in-situ method at that." Thus, in 1976, Geokinetics entered into a cooperative agreement with DOE to help fund the project, and, continues Lekas, "We've been with DOE ever since."

So far, Geokinetics has tested its process in areas where the overburden—the earth and rock that covers a shale deposit—is fairly thin. A total of 17 retorts have been burned to produce 35,000 barrels of oil, 12,700 during the last year. The company believes that many areas in Utah and Wyoming are suitable for this technology and that the process will also be workable on shales in the Eastern United States, Australia and Brazil.

"As for the project," Lekas reports, "things have moved along rapidly. However, it took 3 years to drill a well so that we could have running water in the trailers at the site and 3 years to get electricity."

Because Geokinetics' leases are not contiguous, the company plans to produce shale oil from more than one site at a time, and each site will have several retorts operating simultaneously. The size of each underground retort is approximately 1 acre, and the company's current operational retort is producing 100 barrels of oil/day.

According to Henry Patton, chairman of Geokinetics' board, it would take 15 operating retorts, each producing about 125 barrels of shale oil/day, to comprise a commercial-sized operation. Geokinetics has recently blasted a retort twice the size of the current one, and Patton says perhaps 10 such modules could constitute commercial-scale production, estimated to be 2,000 barrels/day.

Some of the raw shale oil is currently being sold to the Dept. of Defense (DOD), which plans to have the oil refined and then test it for use as a military-specification fuel. Also, a refinery in Salt Lake City has blended the crude shale oil with a specific kind of petroleum fuel and marketed the blend as an industrial fuel.

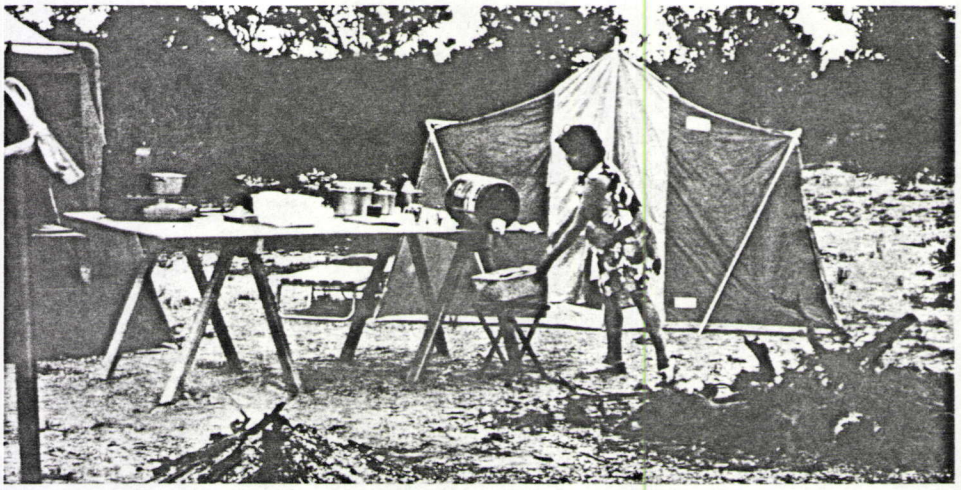
Approaching impacts

Like all other shale development companies, Geokinetics must deal with environmental and socioeconomic impacts. The same environmental baseline studies must be submitted. "But," says Patton, "ours is a true in-situ process, so environmentally, we have less of a problem than the companies that use above-ground or modified in-situ techniques for retorting shale. We don't have to dispose of spent shale, and we don't use any water. In fact, because of the naturally occurring water in the shale itself, we actually create water during the retorting process.

"However, we do have to dispose of the water that is released from the rock during retorting. We do this with large evaporation ponds, and with the appropriate permits, we can also pump the water down deep abandoned dry oil wells in the area. The water is pumped down below the groundwater level," he continues, "which means natural aquifers are not disturbed."

As for social and economic impacts, Patton notes, "Since we employ so few people (about 40), our effect on the surrounding communities is slight. Even when we reach commercial production, which is expected in 1983, we'll have around 100 employees, which really won't make much of a difference in Vernal."

Presently, 25 of Geokinetics' field employees live at Kamp Kerogen, and five live in Vernal. When family members are included in the count, Kamp Kerogen has 40 residents. While the tents of yore have



Kamp Kerogen looked like a family camping expedition during its early years.

given way to trailers, residents must still commute 70 miles into town to pick up mail and do shopping. And, although most families with school-age children live in town, youngsters living on site keep up with school work through correspondence courses offered by Brigham Young University in Salt Lake City.

"The university offers courses for children in grade school through high school," explains Lekas. "The courses follow a preset format that requires the students to be tutored by their parents and do homework every day. Each week the homework is sent to Salt Lake, and several times a month, the children go to Vernal for testing.

"Most of the children have attended regularly scheduled classes before, but seem to like the correspondence study. In fact, some of the parents think that the kids are getting a better education through correspondence school than they did before," he adds.

Although the camp is not intended to be a permanent community, nevertheless, the people who live there have created their own community spirit and improvise social activities. "We try to stress that we're 70 miles from the nearest source of entertainment and other facilities when we hire someone," says Lekas. "The people who like it out here stay, and those who don't usually leave very soon.

"During the winter, the community activities are really pretty limited because it gets dark so early. We have a recreation hall, and once a week people usually get together for a card game. During the summer," he continues, "more goes on. People have barbecues and get together in the evening. The company doesn't sponsor any type of activities, so it's up to the employees to decide how they want to spend their free time."

While city lights are hard to find at Kamp Kerogen, the great outdoors is near at hand. Many of the residents enjoy fishing, hunting and other outdoor activities, and according to Patton, "wouldn't trade it for anything."

The Lekas family has lived at the camp on and off for the last 6 years. Says Lekas, "When I was in college a lot of other careers crossed my mind, but I really like it here. We like to think of ourselves as pioneers—not just because we live in the toolies—but because we're pioneering our method of producing the oil shale resource. Every time we have a 'first' we're proud of the accomplishment."

The path ahead

During 1982 and beyond, Geokinetics plans to continue researching the LOFRECO process by igniting several more full-sized retorts and studying other oil shale properties currently being leased. After this research is complete, production facilities may be moved from Kamp Kerogen to Wolf Den, which is 20 miles away. Should the move take place, Geokinetics will also transfer the support facilities, such as housing, office trailers and maintenance facilities, to Wolf Den, since there are no good roads presently connecting the two sites.

Will Wolf Den be another Kamp Kerogen? "Not necessarily," says Patton. "Although we'll need some facilities to deal with a 24-hour work force, we'd rather have people live in established communities whenever possible."

Although Geokinetics has been involved only with in-situ retorting up to this point, it's possible that the company will use other methods in the future. In September 1980, the company received a grant from DOE to study the feasibility of commercial shale production at Geokinetics' Agency Draw facility in southern Uintah County. Since the Agency Draw shale is located farther beneath the surface than at some of the other sites, recovery will require alternative mining and retorting methods.

Thus, at Agency Draw, Geokinetics plans to test a concept that combines room-and-pillar mining with a secondary recovery process. The room-and-pillar mining method—digging out rooms with pillars of shale left standing between for support—and surface retorting will be the primary recovery method. The LOFRECO process would then be modified for secondary recovery. Once the shale is mined, the remaining support pillars and low-grade shale below the floor of the mine would be fragmented by blasting, and the crushed shale retorted by moving a fire front in a horizontal direction.

Using these two methods, Geokinetics estimates that 20,000 barrels of crude shale oil/day would be produced at the site. However, the study, which includes detailed engineering design and environmental effects, is not scheduled to be completed until June 1982, and a decision to proceed will not be made until after all results are analyzed. And, if more federal shale leases are made available in 1983 or 1984, Geokinetics hopes to obtain larger tracts of land that are suitable for development by the LOFRECO process.

In the meantime, Jim Lekas is carrying on the family shale development tradition by working along with his father and the rest of the members of the Geokinetics clan. And even though operations may seem small when compared to the activities of some of the larger companies, nevertheless, Geokinetics appears to be in the business of making things happen.□